

Ecological site R043BY204WY

Clayey Foothills and Mountains West

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General information

Provisional. A provisional ecological site description has undergone quality control and quality assurance review. It contains a working state and transition model and enough information to identify the ecological site.

Associated sites

R043BY206WY	Clayey Overflow Foothills and Mountains West Clayey Overflow
R043BY222WY	Loamy Foothills and Mountains West

Similar sites

R034AY204WY	Clayey Foothills and Basins West (Cy) Clayey (Cy) 10-14W has lower production and no mountain brome or spike fescue.
R043BY222WY	Loamy Foothills and Mountains West Loamy (Ly) 15-19W has coarser soil textures and more diverse grass species.

Table 1. Dominant plant species

Tree	Not specified
Shrub	Not specified
Herbaceous	Not specified

Physiographic features

This site is found in valley bottoms and on gently sloping to steep mountain slopes. It is found on all exposures with a tendency toward north and east slopes at lower elevations.

Table 2. Representative physiographic features

Landforms	(1) Hill (2) Alluvial fan (3) Stream terrace
Flooding frequency	None
Ponding frequency	None
Elevation	1,710 – 2,530 m
Slope	0 – 60 %
Ponding depth	0 cm
Aspect	Aspect is not a significant factor

Climatic features

Annual precipitation ranges from 15-19 inches per year. Wide fluctuations may occur in yearly precipitation and result in more dry years than those with more than normal precipitation. Temperatures show a wide range between summer and winter and between daily maximums and minimums. This is predominantly due to the high elevation and dry air, which permits rapid incoming and outgoing radiation. Cold air outbreaks in winter move rapidly from northwest to southeast and account for extreme minimum temperatures. Extreme storms may occur during the winter, but most severely affect ranch operations during late winter and spring.

Prevailing winds are from the southwest, and strong winds are less frequent than over other areas of Wyoming. Occasional storms, however, can bring brief periods of high winds with gusts exceeding 50 mph.

Growth of native cool season plants begins about May 15 and continues to about August 15.

The following information is from the “Jackson” climate station:

Minimum Maximum 5 yrs. out of 10 between

Frost-free period (days): 12 60 July 9 – August 12

Freeze-free period (days): 42 100 June 20 – August 26

Annual Precipitation (inches): <11.98 >19.69 (2 years in 10)

Mean annual precipitation: 17.00 inches

Mean annual air temperature: 38.9 F (23.3 F Avg. Min. to 54.5 F Avg. Max.)

For detailed information visit the Natural Resources Conservation Service National Water and Climate Center at <http://www.wcc.nrcs.usda.gov/cgibin/state.plstate=wy> website. Other climate stations representative of this precipitation zone include “Afton” in Lincoln County; and “Darwin Ranch” in Teton County.

Table 3 Representative climatic features

Frost-free period (average)	60 days
Freeze-free period (average)	100 days

Precipitation total (average)	480 mm
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Influencing water features

Soil features

These are moderately deep (greater than 20" to bedrock) to very deep, well drained soils with textures ranging from clay and silty clay through the finer silty and sandy clay loams. Soil cracking (not severe) occurs during the dry summer months especially where the plant cover has been reduced. Root penetration is somewhat restricted due to the fine textures and reduced depth of moisture penetration. Water holding capacity is high, but the surface intake is restricted which causes runoff and reduces effectiveness of precipitation.

Table 4. Representative soil features

Surface texture	(1) Loam (2) Clay loam (3) Sandy clay loam
Family particle size	(1) Clayey
Drainage class	Well drained
Permeability class	Very slow to moderately slow
Soil depth	50 – 150 cm
Surface fragment cover <=3"	0 – 10 %
Surface fragment cover >3"	Not specified
Available water capacity (0-101.6cm)	7.62 – 15.24 cm
Calcium carbonate equivalent (0-101.6cm)	10 – 20 %
Electrical conductivity (0-101.6cm)	0 – 20 mmhos/cm

Sodium adsorption ratio (0-101.6cm)	0 – 10
Soil reaction (1:1 water) (0-101.6cm)	7.4 – 10
Subsurface fragment volume <=3" (Depth not specified)	0 – 10 %
Subsurface fragment volume >3" (Depth not specified)	Not specified

Ecological dynamics

As this site deteriorates because of a combination of frequent and severe grazing, species such as rhizomatous wheatgrasses, Idaho fescue, Letterman needlegrass, Sandberg bluegrass, mountain big sagebrush, snowberry, and green rabbitbrush will increase. Bluebunch wheatgrass, western needlegrass, slender wheatgrass, serviceberry, and mountain brome will decrease in frequency and production.

The Historic Climax Plant Community (description follows the plant community diagram) has been determined by study of rangeland relic areas, or areas protected from excessive disturbance. Trends in plant communities going from heavily grazed areas to lightly grazed areas, seasonal use pastures, and historical accounts have also been used.

The following is a State and Transition Model Diagram that illustrates the common plant communities (states) that can occur on the site and the transitions between these communities. The ecological processes will be discussed in more detail in the plant community narratives following the diagram.

State and transition model

Additional community tables

Table 5. Community 1.1 plant community composition

Group	Common Name	Symbol	Scientific Name	Annual Production ()	Foliar Cover (%)
Grass/Grasslike					
1				202-504	
	thickspike wheatgrass	ELLAL	<i>Elymus lanceolatus ssp. lanceolatus</i>	202-504	–
	western wheatgrass	PASM	<i>Pascopyrum smithii</i>	202-504	–
	thickspike wheatgrass	ELLAL	<i>Elymus lanceolatus ssp. lanceolatus</i>	202-504	–
	western wheatgrass	PASM	<i>Pascopyrum smithii</i>	202-504	–
2				202-404	
	bluebunch wheatgrass	PSSP6	<i>Pseudoroegneria spicata</i>	202-404	–
3				202-404	
	western needlegrass	ACOC3	<i>Achnatherum occidentale</i>	202-404	–
4				101-202	

	mountain brome	BRMA4	<i>Bromus marginatus</i>	101-202	–
5				101-202	
	slender wheatgrass	ELTR7	<i>Elymus trachycaulus</i>	101-202	–
6				101-202	
	spike fescue	LEKI2	<i>Leucopoa kingii</i>	101-202	–
7				202-404	
	Grass, perennial	2GP	<i>Grass, perennial</i>	0-101	–
	Letterman's needlegrass	ACLE9	<i>Achnatherum lettermanii</i>	0-101	–
	Columbia needlegrass	ACNE9	<i>Achnatherum nelsonii</i>	0-101	–
	Porter brome	BRPO2	<i>Bromus porteri</i>	0-101	–
	sun sedge	CAINH2	<i>Carex inops ssp. heliophila</i>	0-101	–
	California oatgrass	DACA3	<i>Danthonia californica</i>	0-101	–
	timber oatgrass	DAIN	<i>Danthonia intermedia</i>	0-101	–
	squirreltail	ELEL5	<i>Elymus elymoides</i>	0-101	–
	blue wildrye	ELGL	<i>Elymus glaucus</i>	0-101	–
	Idaho fescue	FEID	<i>Festuca idahoensis</i>	0-101	–
	prairie Junegrass	KOMA	<i>Koeleria macrantha</i>	0-101	–
	basin wildrye	LECI4	<i>Leymus cinereus</i>	0-101	–
	oniongrass	MEBU	<i>Melica bulbosa</i>	0-101	–
	muttongrass	POFE	<i>Poa fendleriana</i>	0-101	–
	Sandberg bluegrass	POSE	<i>Poa secunda</i>	0-101	–
Forb					
8				101-303	
	Forb, perennial	2FP	<i>Forb, perennial</i>	0-101	–
	common yarrow	ACMI2	<i>Achillea millefolium</i>	0-101	–
	agoseris	AGOSE	<i>Agoseris</i>	0-101	–
	pussytoes	ANTEN	<i>Antennaria</i>	0-101	–
	milkvetch	ASTRA	<i>Astragalus</i>	0-101	–
	arrowleaf balsamroot	BASA3	<i>Balsamorhiza sagittata</i>	0-101	–
	Indian paintbrush	CASTI2	<i>Castilleja</i>	0-101	–
	hawksbeard	CREPI	<i>Crepis</i>	0-101	–
	larkspur	DELPH	<i>Delphinium</i>	0-101	–
	fleabane	ERIGE2	<i>Erigeron</i>	0-101	–
	buckwheat	ERIOG	<i>Eriogonum</i>	0-101	–
	aster	EUCEP2	<i>Eucephalus</i>	0-101	–
	geranium	GERAN	<i>Geranium</i>	0-101	–
	common sneezeweed	HEAU	<i>Helenium autumnale</i>	0-101	–
	little sunflower	HEPU3	<i>Helianthus pumilus</i>	0-101	–
	pea	LATHY	<i>Lathyrus</i>	0-101	–
	stoneseed	LITHO3	<i>Lithospermum</i>	0-101	–
	desertparsley	LOMAT	<i>Lomatium</i>	0-101	–
	lupine	LUPIN	<i>Lupinus</i>	0-101	–
	creeping barberry	MARE11	<i>Mahonia repens</i>	0-101	–
	bluebells	MERTE	<i>Mertensia</i>	0-101	–
	ragwort	PACKE	<i>Packera</i>	0-101	–
	beardtongue	PENST	<i>Penstemon</i>	0-101	–

	phlox	PHLOX	<i>Phlox</i>	0-101	–
	buttercup	RANUN	<i>Ranunculus</i>	0-101	–
	stonecrop	SEDUM	<i>Sedum</i>	0-101	–
	western meadow-rue	THOC	<i>Thalictrum occidentale</i>	0-101	–
	clover	TRIFO	<i>Trifolium</i>	0-101	–
	American vetch	VIAM	<i>Vicia americana</i>	0-101	–
	violet	VIOLA	<i>Viola</i>	0-101	–
	mule-ears	WYAM	<i>Wyethia amplexicaulis</i>	0-101	–
Shrub/Vine					
9				101-202	
	Saskatoon serviceberry	AMAL2	<i>Amelanchier alnifolia</i>	101-202	–
10				0-101	
	little sagebrush	ARAR8	<i>Artemisia arbuscula</i>	0-101	–
	big sagebrush	ARTR2	<i>Artemisia tridentata</i>	0-101	–
	yellow rabbitbrush	CHVI8	<i>Chrysothamnus viscidiflorus</i>	0-101	–
	western snowberry	SYOC	<i>Symphoricarpos occidentalis</i>	0-101	–

Table 6. Community 2.1 plant community composition

Group	Common Name	Symbol	Scientific Name	Annual Production ()	Foliar Cover (%)
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Table 7. Community 3.1 plant community composition

Group	Common Name	Symbol	Scientific Name	Annual Production ()	Foliar Cover (%)
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Table 8. Community 4.1 plant community composition

Group	Common Name	Symbol	Scientific Name	Annual Production ()	Foliar Cover (%)
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Animal community

Animal Community – Wildlife Interpretations Wheatgrass/Serviceberry Plant Community (HCPC): Suitable thermal and escape cover for mule deer exists. Sagebrush, which can approach 15% protein and 40-60% digestibility, provides important winter forage for mule deer and elk. Year-round habitat is provided for many sagebrush obligate species such as the sage sparrow, Brewer's sparrow, sage thrasher, pygmy rabbit, sagebrush vole, horned lizard, and pronghorn antelope. Other birds that would frequent this plant community include horned larks and golden eagles. Mountain Big Sage/Western Needlegrass Plant Community: This plant community may be useful for the same wildlife that would use the Historic Climax Plant Community. Mountain Big Sage/Rhizomatous Wheatgrass Plant Community: This plant community may be beneficial for the same wildlife that would use the Historic Climax Plant Community. However, the plant community composition is less diverse, and thus, less apt to meet the seasonal needs of these animals. Kentucky Bluegrass/Rhizomatous Wheatgrass Plant Community: These communities provide limited forage for elk, antelope, and mule deer due to low production and lack of sagebrush. Animal Community – Grazing Interpretations The following table lists suggested stocking rates for cattle under continuous season-long grazing under normal growing conditions. These are conservative estimates that should be used only as guidelines in the initial stages of the conservation planning process. Often, the current plant composition does not entirely match any particular plant community (as described in this ecological site description). Because of this, a field visit is recommended, in all cases, to document plant composition and production. More precise carrying capacity estimates should eventually be calculated using this information along with animal preference data, particularly when grazers other than cattle are involved. Under more intensive grazing management, improved harvest efficiencies can result in an increased carrying capacity. If distribution problems occur, stocking rates must be reduced to maintain plant health and vigor. Plant Community Production Carrying Capacity* (lb./ac) (AUM/ac)

Wheatgrass/Serviceberry (HCPC) 1200-2200 .55 Mountain Big Sage/Western Needlegrass 1000-2000 .45 Mountain Big Sage/Rhizomatous Wheatgrass 400-1200 .25 Kentucky Bluegrass/Rhizomatous Wheatgrass 200-800 .1 * - Continuous, season-long grazing by cattle under average growing conditions. Grazing by domestic livestock is one of the major income-producing industries in the area. Rangeland in this area may provide yearlong forage for cattle, sheep, or horses. During the dormant period, the forage for livestock use needs to be supplemented with protein because the quality does not meet minimum livestock requirements.

Hydrological functions

Water is the principal factor limiting forage production on this site. This site is dominated by soils in hydrologic group C, with localized areas in hydrologic group D. Infiltration ranges from slow to moderately slow. Runoff potential for this site varies from moderate to high

depending on soil hydrologic group and ground cover. In many cases, areas with greater than 75% ground cover have the greatest potential for high infiltration and lower runoff. Areas where ground cover is less than 50% have the greatest potential to have reduced infiltration and higher runoff (refer to Part 630, NRCS National Engineering Handbook for detailed hydrologic information). Rills and gullies should not typically be present. Water flow patterns should be barely distinguishable if at all present. Pedestals are only slightly present in association with bunchgrasses. Litter typically falls in place, and signs of movement are not common. Chemical and physical crusts are rare to non-existent. Cryptogamic crusts are present, but only cover 1-2% of the soil surface.

Recreational uses

This site provides hunting opportunities for upland game species. The wide variety of plants which bloom from spring until fall have an esthetic value that appeals to visitors.

Wood products

No appreciable wood products are present on the site.

Inventory data references

Information presented here has been derived from NRCS clipping data and other inventory data. Field observations from range trained personnel were also used. Those involved in developing this site include: Bill Christensen, Range Management Specialist, NRCS; Karen Clause, Range Management Specialist, NRCS; and Everet Bainter, Range Management Specialist, NRCS. Other sources used as references include: USDA NRCS Water and Climate Center, USDA NRCS National Range and Pasture Handbook, and USDA NRCS Soil Surveys from various counties. Inventory Data References Data Source Number of Records Sample Period State County SCS-RANGE-417 58 1966-1986 WY Lincoln & others

Contributors

K. Clause

Rangeland health reference sheet

Interpreting Indicators of Rangeland Health is a qualitative assessment protocol used to determine ecosystem condition based on benchmark characteristics described in the Reference Sheet. A suite of 17 (or more) indicators are typically considered in an assessment. The ecological site(s) representative of an assessment location must be known prior to applying the protocol and must be verified based on soils and climate. Current plant community cannot be used to identify the ecological site.

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Date	03/16/2007
Approved by	
Approval date	
Composition (Indicators 10 and 12) based on	Annual Production

Indicators

1. Number and extent of rills: Rare to nonexistent. Where present, short and widely spaced.

2. Presence of water flow patterns: Barely observable.

3. Number and height of erosional pedestals or terracettes: Rare to nonexistent.

4. Bare ground from Ecological Site Description or other studies (rock, litter, lichen, moss, plant canopy are not bare ground): Bare ground can range from 0-20%.

5. Number of gullies and erosion associated with gullies: Active gullies should not be present.

6. Extent of wind scoured, blowouts and/or depositional areas: Rare to nonexistent.

7. Amount of litter movement (describe size and distance expected to travel): Herbaceous and large woody litter not expected to move.

8. Soil surface (top few mm) resistance to erosion (stability values are averages - most sites will show a range of values): Soil Stability Index ratings range from 3 (interspaces) to 6 (under plant canopy), but average values should be 4.0 or greater.

9. Soil surface structure and SOM content (include type of structure and A-horizon color and thickness): Soil data is limited for this site. Soil OM of 2 to 5% is expected.

10. Effect of community phase composition (relative proportion of different functional groups) and spatial distribution on infiltration and runoff: Plant community consists of 70-80% grasses, 15% forbs, and 5-15% shrubs. Evenly distributed plant canopy (60-95%) and litter, despite slow to moderate infiltration rates, results in minimal runoff. Basal cover is typically 5-15% for this site and does affect runoff on this site.

11. Presence and thickness of compaction layer (usually none; describe soil profile features which may be mistaken for compaction on this site): None.

12. Functional/Structural Groups (list in order of descending dominance by above-ground annual-production or live foliar cover using symbols: >>, >, = to indicate much greater than, greater than, and equal to):

Dominant:

Sub-dominant:

Other:

Additional: Mid-size, cool season bunchgrasses>> cool season rhizomatous grasses>>perennial forbs>perennial shrubs>short cool season bunchgrasses

- 13. Amount of plant mortality and decadence (include which functional groups are expected to show mortality or decadence):**

Minimal decadence, typically associated with shrub component.

- 14. Average percent litter cover (%) and depth (in):** Litter ranges from 5-35% of total canopy measurement with total litter (including beneath the plant canopy) from 50-85% expected. Herbaceous litter depth typically ranges from 5-15mm. Woody litter can be up to a couple inches (4-6 cm).
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- 15. Expected annual annual-production (this is TOTAL above-ground annual-production, not just forage annual-production):**

English: 1200-2200 lb/ac (1800 lb/ac average); Metric 1344-2464 kg/ha (2016 kg/ha average).

- 16. Potential invasive (including noxious) species (native and non-native). List species which BOTH characterize degraded states and have the potential to become a dominant or co-dominant species on the ecological site if their future establishment and growth is not actively controlled by management interventions. Species that become dominant for only one to several years (e.g., short-term response to drought or wildfire) are not invasive plants. Note that unlike other indicators, we are describing what is NOT expected in the reference state for the ecological site:** English: 1200-2200 lb/ac (1800 lb/ac average); Metric 1344-2464 kg/ha (2016 kg/ha average).
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- 17. Perennial plant reproductive capability:** All species are capable of reproducing, except in extreme drought years.
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